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ABSTRACT

The College of Education and Human Services at Western Illinois University has established a model to prepare teachers with technical expertise and new methodologies for using educational resources, in order to enable students to use audio, video, computer, telecommunications, distance learning, and interactive multimedia technologies as essential tools for teaching and learning. The project, made possible by a $500,000 grant from Ameritech Corporation, has involved: (1) development of a Professional Development School relationship with a Springfield (Illinois) public school district linked by distance learning technologies; (2) design of a teacher education curriculum focusing on instructional design, interactive multimedia, distance learning, instructional video, telecommunications, and computer applications; (3) linking these advanced technologies to teaching strategies through cooperative learning, electronic field trips, and other techniques; (4) integration of technology into the teacher education curriculum; (5) training teacher education faculty to model use of information technologies; and (6) acquisition of technology resources for faculty and students. Lessons learned from developing the project are outlined. Appendixes present a schematic representation of a multimedia lab floor plan and lists of equipment. (JDD)

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REFORMING TEACHER EDUCATION THROUGH THE INTEGRATION OF ADVANCED TECHNOLOGIES: CASE STUDY REPORT OF A COLLEGE MODEL

Paper Presented at the 47th Annual Meeting of the
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REFORMING TEACHER EDUCATION THROUGH THE INTEGRATION OF ADVANCED TECHNOLOGIES: CASE STUDY REPORT OF A COLLEGE MODEL

In early 1992, the Illinois State Board of Education articulated eight educational goals to be achieved before the year 2000 if the state is to adequately provide a world class education for students in the 21st century. In close harmony with the President's "Goals 2000" agenda, Illinois' eight goals provide a vision for education and a direction for educators, policy makers, parents, government, business, social agencies, and industry if we are to make the education of children a priority. Illinois goal number 5 states that by the year 2000:

> All Illinois public school students will attend schools which use technology as a resource to support student learning and improve operational efficiency (ISBE, 1992, p. 7).

Achievement of this goal places a great responsibility on administrators and faculty of teacher preparation programs in the state's colleges and universities. New teachers and administrators entering the schools must not only be familiar with the use of advanced technologies for instruction and instructional management, they must also be skilled in the use of advanced instructional strategies which effectively link today's information technologies to teaching and learning. Information age technologies have the potential to profoundly impact teaching and learning. Under the guidance of a skilled teacher, these technologies can make instruction more powerful, information more accessible, and knowledge more adaptable. Information age technologies will also change the way higher education institutions prepare new teachers and administrators entering the profession.

The College of Education and Human Services at Western Illinois University (WIU) has established a model for teacher preparation intended to prepare teachers with technical expertise and with new methodologies for using educational resources beyond textbooks and chalkboards which will enable their students to use audio, video, computer, telecommunications, distance learning, and interactive multimedia technologies as essential tools for teaching and learning.

The WIU model is founded on the following set of assumptions we believe are present in today's information based society: (1) there is a critical need to bring schools into the technology mainstream; (2) teachers must be encouraged to use a variety of non-traditional teaching strategies as they incorporate educational technologies into education; (3) it is crucial to find workable ways to integrate technology into the reform of teacher education programs in a manner that results in meaningful changes in schools today, and especially for schools of the next century; (4) technology facilitates the work of individuals and teams to search for data, make social contacts, converse with subject matter experts, and learn social and communications skills by sharing information with others at distant locations; and (5) information technologies are a means of providing equity and access for students with special needs.

Ameritech Grant Goals and Activities

The College has twice received U.S. Department of Education Star Schools funding to support distance learning initiatives and has a national reputation in the delivery of program offerings transmitted via satellite to K-12 schools both in Illinois and the nation through a partnership agreement with TI-IN Westcott Telecommunications, Dallas, Texas. Also, in Fall 1992, the College received funding from General Telephone Electronics (GTE) to support establishment of the GTE Electronic Classroom, a high-tech classroom for use by College faculty to model for prospective teachers the proper use of computer-based technologies in a classroom setting. With this foundation in the use of advanced technologies for teaching, the College successfully

competed for a $500,000 grant awarded by the Ameritech Corporation in September 1993. Ameritech's purpose in awarding one-half million dollars to WIU was to support the restructuring of an Illinois teacher education program committed to the integration of information technologies throughout its curriculum. The major goals of WIU's Ameritech project include:

1. Assist prospective teachers to evaluate, select, use and integrate communications technology-based instruction into a wide array of academic and vocational subjects in schools for early childhood, elementary, and secondary grade levels.

2. Assist educators to learn how to use advanced communications technologies in their own professional productivity and administrative effectiveness.

3. Develop instructional modules which integrate advanced technologies into undergraduate and graduate course work in all content areas of teacher education.

4. Share information about the project with other educational institutions at the elementary, secondary, and collegiate level throughout the nation.

Since receipt of funding, the College's activities have included acquisition of technology hardware and software to upgrade existing resources and to establish state-of-the-art technology facilities for students and faculty. We have also identified technology competencies to be completed by education majors prior to graduation and have redesigned over 12 courses in the teacher education curriculum by infusing technology into course content and delivery. In addition, we have developed and implemented an ongoing training program to encourage faculty to model the use of new technologies in their own teaching. And, we have established a real time, two-way television linkage with Springfield Public School district #186 located in Illinois' capital city 90 miles southwest of the WIU campus.

Professional Development School Partnership via Distance Learning

A unique aspect of the Ameritech project has been a Professional Development School relationship with Springfield Public School District #186 (SPS) linked by distance learning technologies. We had initiated a partnership with SPS a few years earlier to further our efforts in teacher reform. SPS has placed a strong emphasis on technology integration in the classroom curriculum and has been an exemplary training site for WIU pre-service teachers.

CODEC Connections between SPS and WIU: With monies from Ameritech, we purchased VTEL CODEC (coder/decoder) compressed television units with ceiling mounted cameras and outfitted one classroom at Lincoln Elementary School and another at Springfield High School. A similar CODEC unit in WIU's GTE Electronic Classroom connects WIU with the two schools for two-way, real time interaction in both a video and audio format. The network operates over a mix of fiber optics and copper wire connections on a 1/4 T (fractional T1) transmission rate of 384 kilobits per second. Over the network, we have offered an array of college credit courses; teacher inservice training from College faculty to SPS teachers; insights on classroom instruction from SPS faculty to WIU professors; student enrichment in the areas of math, science, fine arts, and social studies; and we have conducted many business meetings between WIU and SPS faculty and administrators.

Pre-service students have also observed live classroom instruction by SPS teachers. Unobtrusive cameras have been mounted in each of the two Springfield schools. WIU students can thereby watch and hear-- at a distance -- practicing teachers work with their students in actual classroom settings. This use of the system has been especially valuable for pre-service teachers who wish to observe teachers working with students in classrooms which are culturally diverse.

We've also conducted orientation and training for student teachers assigned to SPS, we've "talked" with them about their student teaching experiences, and we've "met" with SPS faculty assigned to supervise WIU student teachers. In fact, College faculty interact on a routine basis with Springfield teachers and staff and with WIU student teachers via the compressed TV network.

Another use of the network has been to conduct "electronic field trips" between students in Springfield and students at other schools around the United States via an audio/video bridge. One significant connection was between Lincoln Elementary School students and students at Northridge Elementary School in California about two months after the January 1994 earthquake which rocked the Los Angeles area. The earthquake epicenter was located just a few miles from Northridge. Fifth grade students at Northridge freely interacted with their counterparts at Lincoln Elementary School and talked about the impact of the earthquake in their lives. The students in Illinois shared their feelings about a fire that had burned portions of Lincoln School a week earlier and also talked about the devastating Mississippi River flooding in the summer of 1993.

Distance Tutoring Program: A low-level technology link between the College and Franklin Middle School in Springfield makes use of video telephones and facsimile machines to create a "homework hot-line" for students. Four afternoons per week, immediately after school, interested students are invited to the school library to receive special tutoring from school faculty on-site. Within the library, a video telephone and fax machine are also available for students to call into WIU on a toll-free line. Under the direction of an on-site faculty member, Franklin students can "video phone" in to WIU to ask questions from pre-service teacher education tutors in math, science, English, and social studies to ask questions about their homework assignments. Communication is by video telephone and fax machines, thereby permitting a "personal touch" in seeing each other (video phone) and exchanging hard copy of homework/questions via fax machine. The purpose of the distance tutoring program is to acquaint teacher education majors with additional uses of relatively low-cost telecommunications technologies while at the same time giving them an opportunity to work with students in the public schools.

Technology Competencies for Teacher Education Majors

The teacher education curriculum redesign focuses on a basic understanding of *instructional design* and five core technologies: *interactive multimedia, distance learning, instructional video, telecommunications,* and *computer applications.*

In Fall 1994, a task force represented by faculty and administrators in each of the College's teacher education departments began meeting on a regular basis to determine technology competencies in the area of instructional design and these technologies. Selected teachers in the SPS district have also provided input on technology skills and knowledge expected of new teachers entering their district. A final list of competencies has yet to be approved by the University's Teacher Education Council. Once approved, we anticipate that technology competencies will be required of all graduates by the year 2000. As of this writing, the list of competencies include (Baker, 1994):

Instructional Design: The emphasis is on instructional decision-making in a technology-rich environment.

- Identify the advantages, limitations, and instructional applications of a variety of media and communications technologies.
- Prepare an instructional unit pertinent to one's major which takes into account the constraints of an established curriculum, the particular characteristics of a group of learners, and the availability of various types of technology as well as other resources.
- Identify resources (i.e. print publications, telecommunication sources, types of people, and physical settings) for staying current in applications using information technologies in education.

- Indicate how copyright law and fair use principles have been interpreted for education settings.

Interactive multimedia: The emphasis is on what interactive multimedia is, the types of multimedia curriculum materials that are most commonly available for K-12 instruction, and some basic ways to customize multimedia instructional materials.

- Describe the various types/levels of interactive multimedia.
- Demonstrate how to hook up a CD-ROM drive and videodisc player to a computer and a display device; access the content of the CD-ROM, videodisc, or other multimedia curriculum product, and project the images onto a large screen for group instruction.
- Identify common criteria used to select and evaluate interactive multimedia for educational purposes, review several applications using the criteria, and identify some exemplary titles pertinent to one's major.
- Describe how hypermedia is developed (for interactive multimedia instruction) and how videodiscs can be repurposed to create a lesson for a K-12 audience. Produce a simple lesson using either a hypermedia tool or by repurposing a commercial videodisc.
- Design a thematic unit or other curriculum-development project in which interactive multimedia is properly integrated into the teaching/learning process.

Distance Learning: The emphasis is on how interactive television and other live distance learning technologies are being implemented in K-12 schools in Illinois and how teachers are involved.

- Describe the various types of distance learning technologies applied in K-12 environments as well as their strengths and weaknesses (e.g., audio conferencing, cable television, ITFS, compressed video, satellite TV, etc.).
- Identify effective presentation and interaction skills applied by teachers who use television as the major medium for distance education.
- Describe major distance education initiatives impacting K-12 schools in Illinois.

Instructional Video: The emphasis is on effective integration of video into the K-12 classroom and curriculum.

- Demonstrate how to operate a VCR and select and effectively integrate a videotape or video clip into existing K-12 curricula.
- Produce an instructional video by:
  a) completing pre-production activities such as planning, scripting, audio/video sequencing, and storyboarding;
  b) shooting the video in teams; operating a video camera, tripod, and microphone; and using effective camera movement and composition techniques; and
  c) editing the tape.
- Evaluate at least three commercially produced instructional materials (video, multimedia, print, etc.), citing effective and ineffective visual design principles that are incorporated into each.
- Create digitized video clips, photographs, and clip art components for an electronic presentation/lesson. Produce an electronic presentation using the components to effectively communicate an educational message.

Telecommunications: The emphasis is on how to use various telecommunications networks to support teaching and learning activities.

- Access and effectively search an electronic library catalog on a LAN or the Internet.
- Conduct a multi-message dialog with other students, professors, or professionals via e-mail. Include file transfer as part of the exchange. Explain how this can be accomplished using a modem when a computer is not connected directly to a network.
- Describe different types of networks (e.g., LAN, WAN, Internet) and explain how to use them

to share information. Participate in at least one joint project between groups or classes at distant sites across a network (e.g., listservs, discussion groups, bulletin boards, data sharing, or joint authoring projects).

- Select a topic of interest and use the Internet to locate public domain or shareware software, multimedia resources, on-line databases such as ERIC, and other resources of value to K-12 teachers and students. Maintain a log of the search, describing the resources and listing their Internet addresses.
- Design a thematic unit or other curriculum development project in which telecommunications are integrated effectively into the teaching/learning process.

Computer Technologies: The emphasis is on how to use a computer to increase productivity for teachers (word processing, spreadsheets, database, graphics, software evaluation, instructional materials development, etc.) and integrate its use into the everyday functioning of the classroom.

- Create original word processing, spreadsheet, and database documents that can be used for teaching and/or learning, administrative applications, or communication with parents and other community members.
- Demonstrate desktop publishing skills by producing a newsletter that incorporates graphics and multi-columned text that could be used for school, parents, or community groups.
- Identify criteria commonly used to evaluate software, review several types of software using pre-determined criteria, and identify exemplary titles pertinent to one's major.
- Describe the advantages and disadvantages of using a computer in a classroom and in a computer lab setting with students. Describe effective educational uses of computers in both settings.
- Design a thematic unit or other curriculum development project in which appropriate computer software is integrated effectively into the teaching/learning process.
- Set up, operate, and explain user maintenance of a microcomputer system with it corresponding peripherals.

Specific Instructional Strategies For Infusing Technology Into Teaching

We recognize that imposing technology competencies alone will be incomplete if we do not also provide pre-service educators with appropriate instructional strategies for infusing advanced technology into teaching. Today's information and communication technologies have made it impossible for the teacher to be the "all knowing master" in the classroom. If we are to be successful in implementing a technology-based curriculum model, we must empower students to be responsible for their own learning by (1) teaching them new approaches to acquiring knowledge (rather than listening chiefly to lectures or just reading textbooks) that optimize new technologies and informational tools and (2) by providing instructional resources beyond text books that expand students' opportunities to acquire new knowledge and information. In short, we have linked advanced technologies to advanced teaching strategies. Classrooms employing advanced teaching strategies, yet devoid of advanced technologies, are only meeting half of the equation to improve schools. The same is true of classrooms with advanced technologies, but pursuing the traditional approach of a teacher-dominated learning environment without incorporating new teaching strategies.

Accordingly, the WIU model recognizes that young people must accept increased accountability to learn on their own and to draw meaningful conclusions from such inquiry. New teaching/learning methods which have been researched in recent years as successful strategies for increasing student accountability include, but are not limited to, cooperative learning, thematic teaching, electronic field trips, guided inquiry, apprenticeship learning, group problem solving, and critical thinking (D'Ignazio and Shultz, 1991).

Cooperative Learning: Under the teacher's direction, students work in teams that are self-managed and pursue self-guided inquiry. Students are responsible for their own learning and their teammates' learning. Students rotate the role of leader and other roles. No student is supposed to know everything, but all students are encouraged to make a contribution.

Electronic Field Trips: Modern telecommunications technologies such as video telephones, facsimile machines, and computer modems permit students and teachers -- at relatively low cost via use of regular telephone lines -- the opportunity to speak with and view students in other parts of the nation/world, share printed and graphic materials, and search large data bases for detailed information on thousands of topics. Working individually or in teams, students organize and plan electronic searches, make social contact with students in other schools and with subject matter experts, and learn social and communications skills in sharing information with others at distant locations.

Thematic Teaching: The teacher functions as a classroom leader-facilitator. Several topics of study may be combined under umbrella themes such as Russia, whales, space exploration, etc. The themes contain units across the curriculum and apply topics to real-world problems and issues. Students work independently or in teams to gather information on subtopics within a common classroom theme. Information gathered by individuals or teams is shared with the entire class to produce a final product.

Guided Inquiry: The teacher teaches not by telling students facts and answers, but by posing problems, mysteries, and questions that challenge student teams or individuals to investigate topics on their own. The teacher guides the inquiry to help students interpret recent findings, make interpretations of their own, etc.

Apprenticeship: Learning by doing is the focus of apprenticeship training. The practice is under the guidance of a teacher who challenges students to do deeper investigating into a given subject. Students learn to communicate their understanding clearly and effectively to other students, and they must "show that they know" and understand the topic under study.

Group Problem Solving: In group problem solving, students get hands-on training by experimenting with numerous group problem solving strategies. They might learn new verbal skills, written skills, computer skills, etc. The teacher constantly challenges the group with interesting problems that would be too long or too complex for any individual to solve on their own. Students learn that they are smarter, quicker, and stronger as a team than they are on their own.

Critical Thinking: In the classroom of the future, the teacher's strategy will often be to place the student in confusing, uncertain situations in which students understand only partly what is expected of them and how they are to accomplish a certain task. As students work individually and together to gather information that will help them accomplish a mutual goal, they have opportunities to participate in higher level thinking activities and are forced to make decisions and see the outcome of their decision making.

The technology infusion effort is to have professors model with pre-service teachers the specific instructional strategies noted above. As a result, students in teacher preparation classes learn new instructional methods at the same time they are involved in an electronic field trip, as they search an online database, as they interact with a CD-ROM interactive multimedia package, or while they exchange electronic mail messages with individuals across the country.

Integration of Technology into WIU'S Teacher Education Curriculum

As noted earlier, the WIU model is centered on correct principles of *instructional design* focused

around the five technologies of *interactive multimedia, instructional video, distance learning, telecommunications,* and *computer applications*. These five technologies are introduced to students in two classes offered by the Department of Media and Educational Technology, EC 209, "Educational Microcomputing and Technology" and AV 240, "Production of Instructional Materials." Core technology competencies are imbedded in these two courses which provide students with skills in (1) "how to use" these specific technologies, and (2) knowledge in using specific instructional strategies for properly integrating technology into teaching. Both courses are taken by nearly all elementary education and special education majors with tentative plans to make these required classes of all education majors beginning in Fall 1996.

Besides the EC 209 and AV 240 courses, a number of content methods courses have been redesigned to include technology-based units of instruction. Over 25 faculty, with guidance from our Instructional Designer, are in various stages of developing technology units for their classes. Each unit incorporates a minimum of two types of technological applications. For example, in an elementary science methods course, teacher education majors might be provided with in-depth experience in working with individual and group learning strategies which emphasize inquiry and information gathering. To model the appropriate strategies, the professor might assign pre-service teachers to work with a CD-ROM multimedia program on environmental science, students might search an online library database for journal articles on the environment, or they might search through an electronic bulletin board or connect via electronic mail to an expert studying the environment and begin an electronic dialogue, etc. The goal of this technology infusion effort is to have faculty model specific instructional strategies (e.g., electronic field trips, guided inquiry, cooperative learning, etc.) that optimize the use of technology resources. As a result, students learn new instructional methods at the same time they are involved in using the technologies. In short, pre-service teachers can only learn to use the new technologies if they have a chance to work directly with those technologies as they learn both the subject content and an appropriate methodology for teaching that content. The best way to guarantee that students will have such opportunities is to assure that College faculty themselves have the skills to use the technologies in their own teaching and model those skills regularly in the classroom.

Curriculum redesign efforts by selected departments in the College's teacher education program include:

The Department of Media & Educational Technology provides the two introductory courses mentioned above. In addition, two other courses have been infused with technology-based units. One focuses on library uses of online and CD-ROM electronic bibliographic searches. The other, a children's literature course, uses CD-ROM reference tools to identify children's books and locate information about authors.

The Department of Elementary Education & Reading has redesigned five courses: (1) "Teaching Social Studies Methods with Historic Places," a joint project to study historical sites in Virginia and those in Illinois between students at George Mason University in Virginia and WIU students using electronic mail, electronic searching, listserv communication, videophone and fax communications, and distance learning connections via two-way compressed TV. (2) "Best Practices for 3, 4, & 5 Year Olds," curriculum units using thematic learning strategies which integrate computer and multimedia learning materials. (3) "Parent Involvement," a course which focuses on working with and involving parents using computer databases, desktop publishing, and instructional video development. (4) "Elementary Science Methods," integrates computer-based activities into science education such as modeling, data collection and analysis, electronic communication with scientists and databases, and technology-based instructional materials awareness for science education. And, (5) a series of reading methods courses which incorporate Hypertext software programs that introduce students to thematic unit development for reading instruction.

The Department of Educational Foundations has modified two courses: "Learning," using instructional video, distance learning, and interactive audience response pads to teach adolescent development and model the use of technology to conceptually show how students learn and analyze new information. An "Applied Science Methods" course for secondary education majors provides students with "hands-on" experience in developing electronic presentations for TechPrep instruction in the areas of business, agriculture, industrial technology, vocational education, and home economics.

The Department of Special Education has developed technology units in one of its methods courses wherein pre-service students -- in a cooperative learning environment -- design, produce, and edit instructional videos for learners with disabilities and other special needs.

Training Teacher Education Faculty to Model Use of Information Technologies

Getting cooperation from faculty to use new technologies and corresponding strategies in their courses has necessitated sensitivity on the part of College administrators. Our desire has been to create a supportive environment that offers motivation, incentives, and rewards such as released time, funding for travel, and/or recognition of such activity in the personnel decisions of promotion, tenure, and merit awards. As part of creating a supportive environment, however, our priority has been to provide technology training on a regular and ongoing basis.

Two support personnel in the College have been the key to this training -- our Instructional Designer and one of our System's Managers (technician). Our System's Manager offers individualized orientation/training sessions for faculty planning to use our electronic classrooms. These sessions last about 30 minutes and focus on the hardware in these high-tech rooms as well as some of the associated software/courseware. In fact, before faculty are allowed to use the rooms, they must first complete the required orientation/training.

The College's Instructional Designer offers a variety of workshops for faculty each semester covering such topics as "Electronic Presentations," "Using the Internet," "Using Telecommunications for Classroom Projects," and "Distance Teaching Using Compressed Video Technology." Workshop topics are based on faculty requests and frequently asked questions posed by the faculty. These ongoing workshops (many of them entailing multiple sections to accommodate participants) have enrolled over 140 faculty in the past 18 months.

Besides workshops, the Instructional Designer also addresses many faculty needs through one-on-one instruction, responding with 10-15 contacts per week: answering questions, offering individual lessons, providing workshop follow-up assistance, brainstorming ideas for instructional applications of technology relevant to faculty members' content areas, recommending software, troubleshooting when faculty come into the Faculty Instructional Development Lab adjoining her office, and providing information needed in the grants they write, whether it be data about the technology resources available, or about how to incorporate uses of technology into their project.

In addition to these support personnel, WIU faculty also receive training from their colleagues. For example, one faculty member has offered -- and will repeat the offering of -- a one semester hour course, "Seminar in Instructional Technology," designed specifically to prepare post secondary instructors for teaching via our two-way compressed TV distance learning network. Because this course is offered to an 11-site regional consortium, not only WIU faculty but many community college faculty have the opportunity to receive instruction from an experienced colleague in the pedagogical as well as technological issues of distance teaching and learning.

Not all training and inservice has been provided by College personnel. Several programs have been developed and delivered by teachers and staff at Lincoln Elementary School in Springfield,

Illinois. In November 1993, the Director of Technology and the Instructional Technology Facilitator of the Springfield Public School District #186 offered a 3-hour program for 35 faculty on the role of technology in the classroom. In early February 1995, a two and one-half hour workshop was presented by 5th and 6th grade teachers and students demonstrating how they use computers as a resource for collaborative learning projects. After a live demonstration, a half-hour video was shown, chronicling a social studies project, followed by a dialogue between College faculty at WIU and Springfield teachers discussing instructional planning, methodology, classroom management, and assessment of collaborative learning in technology-rich teaching and learning environments.

In summary, our training has been multifaceted because our technology is multifaceted. We have operated on the notion that training must be offered in modes and at times that accommodate faculty needs, interests, schedules, and disciplines. Finally, we have observed that some of our more reluctant or skeptical faculty have altered their reticence to use new technologies as they have seen the successes of their colleagues.

Technology Resources for Faculty and Students

New equipment acquisitions for the College have included: (1) Upgrading of existing computer facilities to create an advanced computer lab with multimedia stations enabling students to preview CD-ROM courseware. (2) Establishment of an interactive multimedia lab with high level personal computers with CD-ROM drives, laser disc players, TV monitors, scanners, a CD-ROM "press," and other peripherals for interactive multimedia production and instruction. (3) Creation of seven additional electronic classrooms, equipped with a variety of advanced technologies including VTel CODEC teleconferencing equipment, Macintosh Power PC computers, video projectors, ELMO visual presenters, etc. (4) Establishment of an instructional video lab which houses digital video camcorders available for student check-out and advanced digital editing equipment for student production of educational and/or training videotapes. And (5), Establishment of a Faculty Instructional Development Lab as a resource for faculty to design and develop instructional materials for use in their classes.

Advanced Microcomputer Lab: Housed within the College is a state-of-the-art student computer lab which has 20 Macintosh Centris 610 machines, 25 MS-DOS 486 machines, printers for both platforms, and a one gigabyte file server. Each machine is networked via an Ethernet connection for file server access and to the full range of services on the Internet. Fifteen work stations have also been upgraded with CD-ROM drives, videodisc players, TV monitors, and audio headsets. These machines are used by students to review, evaluate, and to repurpose interactive multimedia programs available in both CD-ROM and videodisc formats.

Interactive Multimedia Lab: An interactive multimedia laboratory was established in January 1995 with an investment of over $60,000 in equipment and furnishings to purchase 11 high level Macintosh computers (a mix of Macintosh Power PC's, AV 650, and AV 840 machines). Peripherals include CD-ROM drives, video monitors, printers, scanners, and a CD-ROM press for local production of CD-ROMs. Whereas upgraded interactive work stations in the Advanced Microcomputer Lab are for review and some repurposing of interactive multimedia programs, the Interactive Multimedia Lab is used for advanced multimedia applications including original pressing of CD-ROM discs. Appendix A depicts the room layout and design of the Interactive Multimedia Lab.

New Electronic Classrooms:
The GTE Electronic Classroom, established in 1992, has served as a model teaching/demonstration facility to acquaint prospective teachers on how to properly use advanced technologies in teaching. The room itself seats 88 students and has audio/video outputs for either Macintosh or MS-DOS computer platforms equipped with CD-ROMs. Computer-controlled outputs are also available for

a videodisc player, 35 mm slide projector, videotape player, satellite TV programming, a document camera, etc. Faculty use of the GTE Electronic Classroom has increased each semester to the point that it is now the most scheduled room in the College, and we have been unable to accommodate the many faculty who want to use the room and its high tech resources.

To offset demand for use of the GTE Classroom, we have established seven new electronic classrooms. While these are not nearly as elaborate (or costly) as the GTE Classroom, each enables faculty to use a variety of instruction technologies not available in traditional classrooms. These new electronic classrooms have been established in existing rooms, each capable of seating 30-40 students. To distinguish the extent of technology resources available in each room, we have designated these rooms as Level II, Level III, and Level IV rooms with the GTE Classroom identified as a Level I room. For example, the Level II room has 2 ceiling mounted video projectors, a document camera, a VCR player/recorder, a laser disc player, a dual platform Macintosh/MS-DOS computer with CD-ROM drive, and external audio speakers. A Level III room has the same equipment with the exception of only one video projector (ceiling mounted) and it does not have a videodisc player. And, a Level IV room has the same as a Level III with the exception of a computer. See Appendix B for a depiction of equipment items in Level I, II, III, and IV rooms. Any Level III or Level IV room could easily be upgraded to a Level II with the addition of a few equipment pieces. The cost for equipment items in the Level II through Level IV electronic classrooms has ranged from $8500 to $18,000.

Instructional Video Lab: A total of $24,000 has been expended in fiscal year 1994 to establish an Instructional Video Laboratory. This lab is for use by prospective teachers in "shooting" and editing video footage to create instructional video programs and/or training tapes for use in instruction. Equipment in the lab includes four computer-operated digital editing systems and 12 high-band 8mm video cameras available for student check-out.

Faculty Instructional Development Lab: This lab has been designed solely for faculty use . It is separate from the Interactive Multimedia Lab and the Advanced Computer Lab so that faculty can work uninterrupted from students and/or other faculty. It is a high-tech lab where faculty can learn new software/courseware and/or create technology-based instructional materials for their classes. This lab has high-end personal computers, videodisc players, TV monitors, scanners, sound systems, and other peripherals to permit full-range production of interactive multimedia instructional materials. This lab also houses the bulk of software/courseware used by faculty for instructional development. The College's full-time instructional designer is officed near the lab to assist faculty in its use.

Lessons Learned

The task of fully integrating technology into the College's teacher education program has been an ongoing activity of the past several years. While state appropriated dollars have been used to place personal computers in faculty offices and to upgrade facilities, external grants have provided the bulk of funding for many of our initiatives. Over the years we've learned some valuable lessons. These include:

1. Faculty must be provided with equipment and laboratory facilities if they are expected to use technology as tools of their profession. We've provided all teacher education faculty with computers on their desks which are Ethernet connected to access software programs on a number of file servers on campus. Furthermore, all personal computers are linked for internal e-mail and can connect to the Internet for external e-mail and the many services available on the Internet. Also, establishment of the Faculty Instructional Development Lab has given faculty a facility, away from interruption, where they can learn new software/courseware and design instructional materials for use in the College's electronic classrooms.

2. Have a team of qualified personnel in place who not only have a good grasp of technology and its uses for teaching, but also understand correct principles of instructional design and teacher pedagogy. We have a full-time instructional designer on staff and a technology support team of 15 personnel in the Satellite Education Network and Interactive Technologies unit in the College. Creating positions for technical staff has been achieved chiefly through external grant dollars as well as reallocation of some personnel dollars resulting from faculty attrition.

3. Communicate regularly with faculty and administrators in the Professional Development School partnership. Due to the 90 mile one-way distance between Springfield Public School District #186 and the WIU campus, most of our contact has been through two-way video conferencing. These conferences have been held to plan, coordinate, and follow-through on program related activities. SPS teachers have also provided input to our technology competencies, have delivered inservice training to College faculty, worked closely with selected College faculty to discuss supervision of student teachers, etc.

4. Communicate activities and ongoing plans with teacher education faculty. In the development and design of our technology facilities, a College-wide Technology Committee was organized to decide on equipment needs, facility design, determine software/courseware titles, etc. In addition to working with a designated committee, it is also important to send regular communiques, newsletters, etc., to other faculty so that all are kept abreast of developments and have opportunity for input.

5. Involve faculty in relevant aspects of decision making. Faculty participation in identifying technology competencies and in the writing of new curricula for technology infusion has been crucial. These efforts have been directed by our instructional designer with assistance from College administrators. As appropriate, faculty have been given load release for curriculum development.

6. Plan and budget for electrical wiring, networking, and room remodeling when establishing new facilities for technology. Our building is over 30 years old so the infrastructure for today's advanced networking and wiring was not in place. In each of our labs, we had to re-wire, network, and in some cases do considerable remodeling to assure that technology use would be optimized. In each case, the costs to upgrade the old infrastructure have exceeded our estimates. Furthermore, we have had to coordinate with University Physical Plant personnel well in advance of desired start-up dates to make sure that room renovations would be ready for equipment installation and classroom instruction when needed.

7. Commit sufficient dollars to educational software and courseware. Equipment has clearly been the most costly consideration in our effort to infuse technology into the teacher education curriculum. At the same time, however, we have budgeted a sizeable dollar amount each year to purchase new software/courseware for faculty and student use.

8. Make sure that training is sufficient to assist faculty in applying the technology. Since many of our faculty lacked training in use of advanced technologies for instruction, we have relied heavily on our instructional designer to schedule faculty workshops each semester as well as offer one-on-one tutoring. Also, we recognize that technology applications are evolving rapidly and that constant re-training is required in order to keep current.

9. Provide visionary leadership. The majority of K-12 schools in our service area do not currently have all the technologies in place which we are now integrating into the curriculum of our teacher preparation program. A few members of our faculty have argued that we should prepare new teachers to use the old technologies which presently exist in many of the schools (e.g., 16mm projectors, opaque projectors, Apple IIe computers, IBM Jr. computers, etc.). The argument was made that exposing pre-service teachers to advanced technologies would

only discourage them when they were hired in area schools and observed how far behind some of the school actually are. We determined that we could either be leaders in the field or we could be followers. We chose to be leaders and to clearly articulate to College faculty the direction we were going. Furthermore, we believe that technology literate teachers entering the schools will act as change-agents in moving schools forward technologically.

10. Hire new faculty who already have a good foundation in technology as an instructional resource or who demonstrate an aptitude and a desire to use advanced technologies as a regular part of their teaching. From the beginning, we've recognized that some of our senior faculty might be reluctant to learn new skills and methods. While most have embraced our agenda and performed admirably, a few have not. As these individuals retire, we will replace them with professors who share our vision and the skills to achieve it.

11. Finally, recognize that investing in technology is not a one-time purchase. The half-life of much of today's computer-based technologies is maddeningly fleeting. Today's innovation can easily become tomorrow's anachronism. A serious resolve to keep up-to-date with today's technologies requires foresight in planning and an ongoing dollar commitment to continually upgrade.

Summary and Conclusion

The College of Education and Human Services at Western Illinois University views infusing technology into teacher education as a priority in preparing new teachers who are entering the profession. It is fully recognized that most public schools do not have information and communications technology resources or trained staff in the areas we are emphasizing. We believe that a new cadre of teachers who are technology literate and confident -- both in terms of how to use technologies and also employ appropriate teaching strategies for their implementation -- will be the catalyst for improving American education. These teachers will be the change agents in helping to move our public school system into the information age and the communications age.

New and developing instructional technologies will continue to bombard the educational marketplace. This is occurring at a time when some teachers are still trying to cope with the introduction of the microcomputer in the mid-1970's. The thought of incorporating laser disc technology, CD-Roms, video text, electronic mail, video imaging, telecommunications, distance learning, and the Internet must seem mind boggling to many. Certainly, the challenge is not a simple one. Yet, if those who administer teacher education programs fail to incorporate modern technology as part of the preparation process for tomorrow's teachers, and if educators in general fail to integrate modern and evolving technology in American classrooms, the education provided in our schools will have limited meaning in the lives of our students.

Reform and improvement efforts in American education begin with the premise that our schools, designed in the industrial age, do not meet the needs of today's information-based society. The task facing today's teachers is to prepare young people for <u>their</u> future, not <u>our</u> past. The U.S. Office of Technology Assessment's epic study *Power On! New Technologies for Teaching and Learning* suggests that the new tools of the information age and the communications age can be pivotal in shaping the American classroom to fit and adapt to its ever changing environment:

> although new interactive technologies cannot alone solve the problems of American education, they have already contributed to important improvements in learning. These tools can play an even greater role in advancing the substance and process of education, both by helping children acquire basic skills and by endowing them with more sophisticated skills so they can acquire and apply knowledge over their lifetimes (U.S. Congress, OTA, p. 4).

References

Baker, M. (1994, November 1). [Technology Competencies. College of Education and Human Services, Western Illinois University]. Unpublished working paper.

D'Ignazio, F. and Shultz, D. (1991, October). An inquiry centered classroom of the future. In *Educational Technology in the Classroom:* Hearings before the Subcommittee on Technology and National Security of the Joint Economic Committee and Subcommittee on Education, Arts and Humanities of the Senate Committee on Labor and Human Resources, United States Congress. Washington, D.C.: Government Printing Office, pp. 229-234.

State of Illinois Board of Higher Education. (1994, September 7). *Focus and Priorities Statements of Illinois Public Universities.*

U.S. Congress, OTA -- Office of Technology Assessment. (1988). *Power on! New tools for teaching and learning.* Washington, DC: U.S. Government Printing Office.

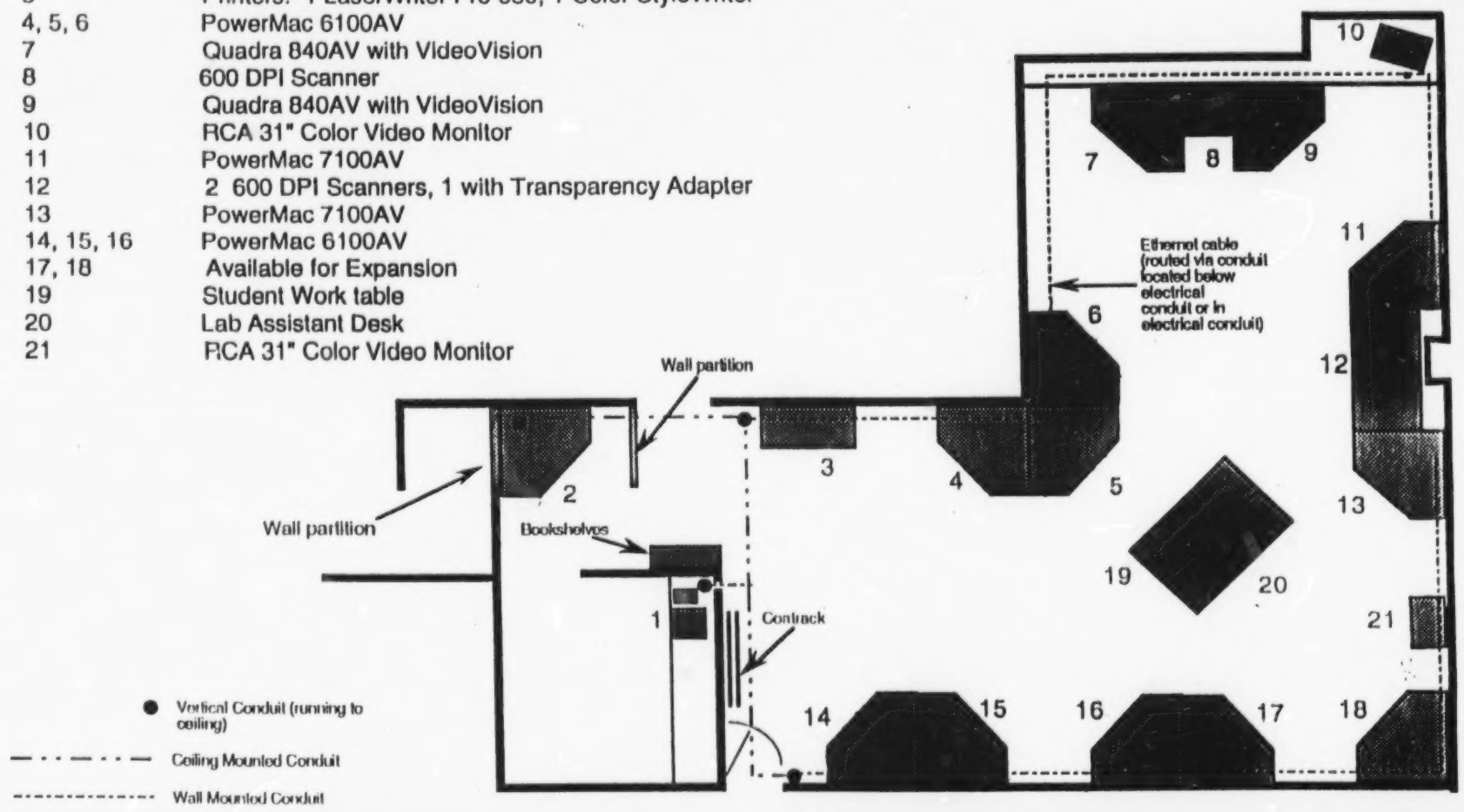
Appendix A

Schematic representation of floor plan and room configuration for WIU's College of Education and Human Services' Interactive Multimedia Lab.

Proposed Layout For HH 82 IMM Lab

Drawn By: K. Turner	Date: September 27, 1994

1	File Server and Hubs
2	Quadra 650 with Sony CD-ROM Authoring Station
3	Printers: 1 LaserWriter Pro 630, 1 Color StyleWriter
4, 5, 6	PowerMac 6100AV
7	Quadra 840AV with VideoVision
8	600 DPI Scanner
9	Quadra 840AV with VideoVision
10	RCA 31" Color Video Monitor
11	PowerMac 7100AV
12	2 600 DPI Scanners, 1 with Transparency Adapter
13	PowerMac 7100AV
14, 15, 16	PowerMac 6100AV
17, 18	Available for Expansion
19	Student Work table
20	Lab Assistant Desk
21	RCA 31" Color Video Monitor



Appendix B

A list of equipment items in the WIU GTE Electronic Classroom (a Level I facility).

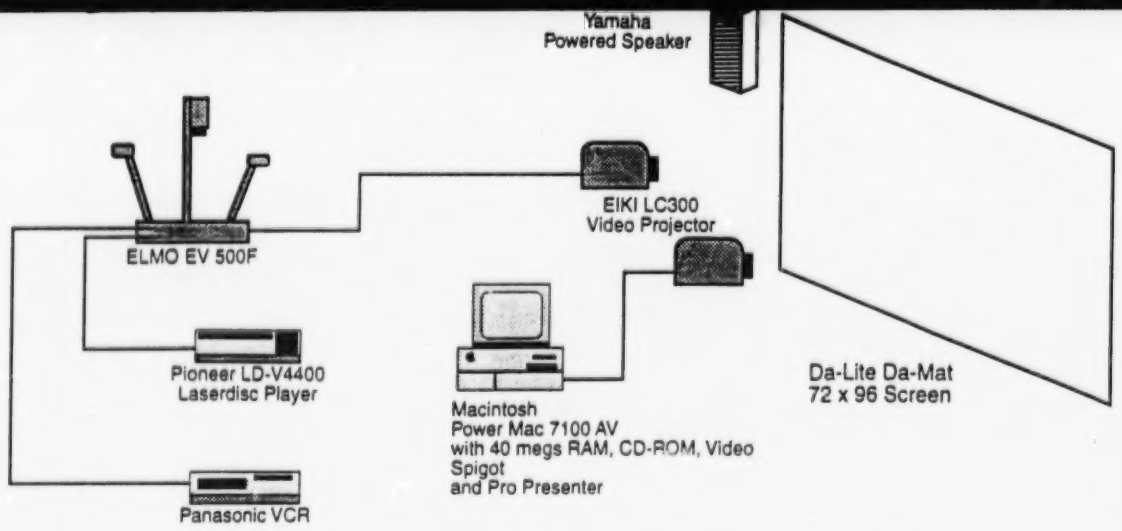
Schematic representative of equipment items in WIU College of Education and Human Services' electronic classroom at Levels II, III, and IV.

***Components of the GTE Electronic Classroom and Approximate Costs**

Listed below are some of the basic equipment items which make up the technology profile for the GTE Electronic Classroom (a Level I facility) when it was first established in November 1992.

• Large projection screen (7' x 20') for image projection from several media	$ 800
• Video projector mounted on ceiling with multisync capabilities for computer and video display	20,000
• Crestron podium with electronic control menu panel for controlling lights, sound, and all media equipment; and two multisync monitors in the podium for displaying the images sent to the large screen projector and a preview monitor	12,000
• 386 PC microcomputer with keyboard	1600
• Macintosh IIci microcomputer 16 MB Ram, 230 MB hard drive, ethernet card, video spigot, CD-ROM drive, keyboard, etc.	5500
• Laserdisc player with interface cable to PC and Macintosh computer	1200
• Videotape player in VHS and S-VHS	1500
• Elmo color slide projector	2400
• Elmo Visual Presenter	3500
• Wireless keypads (30 individual keypads)	22,000
• Robotic cameras (2) mounted from ceiling	7000
• Peripheral hardware, etc.	4000
• Microscope camera	3500
• Site preparation (materials and installation for all sound, lighting, electrical wiring and controls, structural changes to accommodate handicapped, carpeting, acoustics, fiber optics connection, multi-plexer units, etc.)	65,000
Approximate Total	$150,000

*since November 1992 extensive upgrades have been added to the GTE Electronic Classroom. New hardware items include: VTEL CODEC teleconferencing equipment, robotic cameras, MS-DOS 486 PC, Power Macintosh PC, fiber optic connection to satellite uplink transmitter, cable connection to satellite downlink antenna, television monitors, etc. These upgrades have costs approximately $100,000.



Level II "Mini" Electronic Classroom

2 EIKI Video Projector

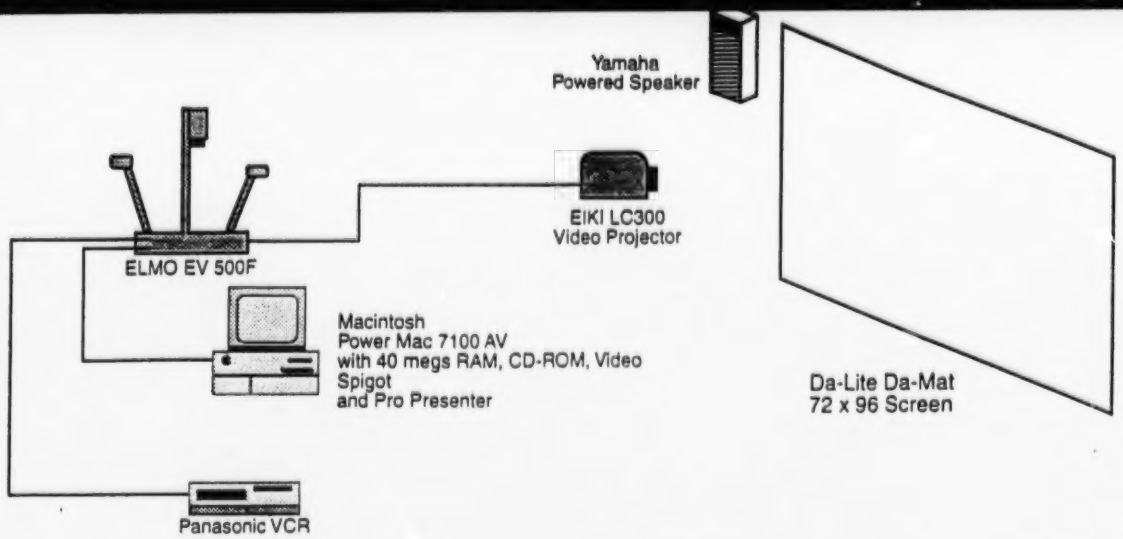
1 ELMO Visual Presentor

1 Panasonic VCR

1 Pioneer Laserdisc Player

1 Apple PowerMac 7100

1 Yamaha Powered Speaker



Level III "Mini" Electronic Classroom

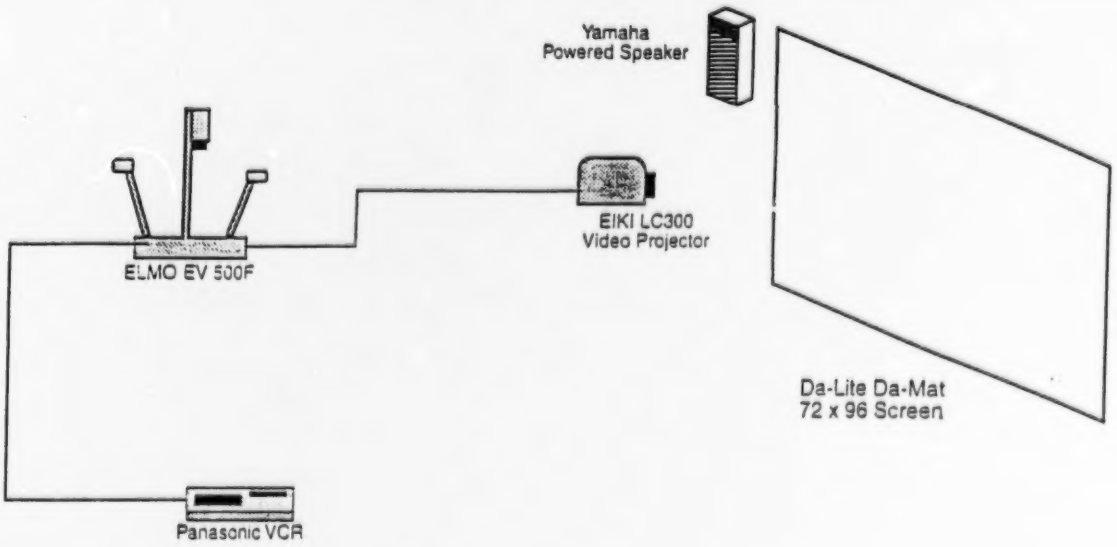
1 EIKI Video Projector

1 ELMO Visual Presentor

1 Panasonic VCR

1 Apple PowerMac 7100

1 Yamaha Powered Speaker



Level IV "Mini" Electronic Classroom

1 EIKI Video Projector

1 ELMO Visual Presentor

1 Panasonic VCR

1 Yamaha Powered Speaker